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ABSTRACT

A discussion of the teaching of languages for special purposes (LSP) argues for giving greater attention to the learner's actual language needs. It suggests that conventional English for special purposes (ESP) is inadequate for the unique linguistic context of Papua New Guinea, and that further research be undertaken into implications of such an environment for LSP. An experiment at the Papua New Guinea University of Technology is then described. The effort emerged from an ESP assignment in which engineering students were asked to write about a technical topic, and had difficulty in making the topic comprehensible to an uninitiated audience. In the second semester, focus was shifted from academic to occupation-oriented English. Students were asked to consider the differences between academic and occupational language use, then rewrite, from memory, on the earlier topic but for an audience of secondary-school-trained workers. They then wrote another paper for an even less-educated audience, in Tok Pisin, and defined specific technical terms in Tok Pisin or an English/Tok Pisin mix. Other writing exercises also focused on simplification and translation into Tok Pisin. The activities illustrate the value of emphasizing the communicative function of language, even technical language, in teaching LSP. (Contains 37 references.) (MSE)

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GOROKA TEACHERS COLLEGE

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POSSIBILITIES FOR RESEARCH INTO LSP: AN EXERCISE AT UNITECH

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The Inadequacy of ESP for PNG

The present teaching programme in the Department of Language and Communication Studies at Unitech is oriented towards the principles of ESP (English for Specific Purposes). Being a "service department", we are concerned primarily with equipping students to use English in academic work (EAP) and in occupations after completing their studies (EOP). (See Smithies, 1981 for the background and rationale for this policy.) The ESP approach seems appropriate to a university of technology: in contrast to secondary school, students are studying in particular specialist fields; hence, their language needs can be identified and given attention in the classroom. This is a more efficient use of resources and makes language teaching a more relevant enterprise than it often is in GE (General English) programmes. Of course, there are problems. For instance, we should try to avoid one of the classic pitfalls of a narrowly orthodox ESP: that it trains students to perform only those tasks specifically taught in class (e.g., Nunan, 1991: 3-4). And we must always pay heed to Kavana's (1981: 44) warning that ESP is inappropriate in PNG if it assumes an English language background more advanced than students actually have. But for most of us in the LCS Department, a general ESP policy is the best way to go if we want to "deliver the goods" (Swatridge, 1985).

And yet when we examine the history of ESP, we find that it developed under language conditions quite different from those existing in PNG. The roots of ESP lie in the shift from a structural to a pragmatic theory of language, one which Widdowson (1978) has characterized as a change from usage to use. The application of these ideas to language teaching resulted in the communicative approach, which emphasizes language as the negotiation of meaning between sender and receiver. Special attention is given to the choice of language the sender considers most suitable for the receiver in particular contexts of situation. In practice, research into teaching language as communication has developed largely in either native-English contexts, or else in contexts where English is to be used by the learner as a foreign language (EFL) within a limited domain. In the latter case assumptions are usually made (covertly or overtly) that communication is with someone who has first-language competence in English and that the goal of English Language Teaching (ELT) is to produce learners who can communicate competently with such speakers for specific purposes.

This bias is found, for example, in the seminal work of Wilkins (1976) and K. Johnson (1982) on notional and communicative syllabuses respectively. These were based on the Council of Europe's guide-lines for language teaching, which were mainly intended to be used in programmes designed to enable foreign

students to communicate successfully with native speakers on the latter's home ground. (See, e.g., van Ek, 1975.) Such an outlook is still apparent in the bulk of ESP materials currently on the market. Many of the ESP texts and tapes (such as The Bellcrest File [1972] book and video) used at Unitech, for example, presuppose that communication is with L1 English-speaking professionals. A teacher who uses such aids in PNG must be prepared to spend time explaining foreign references, implications and allusions. R.K. Johnson (1973) has shown that apparently "simple" texts may take it for granted that the writer and reader share a common background and thus omit information which even a Papua New Guinean fluent in English would require for successful comprehension. (And he cautions against the dangers of using such texts to assess PNG students' abilities in reading English.) As Krishnaswami and Aziz (1978: 101) point out, ESP materials continue to be produced on the assumption that the target language is that of middle-class native speakers and that communication is directed to such speakers, even when (as is the case in PNG) it usually is not.

Another influence on the current practice of ESP at Unitech and other tertiary institutions in PNG is "Language across the Curriculum" or LAC (Robinson, 1985: 1 ff. and Jones, 1973: 46). LAC stresses the close relation between the language class and the functions language performs in students' other subjects, and it is concerned with the need to organize educational institutions to reflect this connection. Most of the research which has led to LAC policies has, again, been carried out in the context of first-language ELT, and the discussion has centered almost exclusively on British secondary schools. Little attention has been given in this research to the possibility of using other languages across the curriculum or to their appropriateness for academic and technical subjects. Developments in ESP syllabus design, methodology and materials production, then, have generally neglected the realities of communication in PNG. Here communication most commonly occurs between non-native speakers of English who also have the option of using other languages. Often it is necessary to use these other languages, in addition to English, for occupational and professional purposes. Sometimes a mixture of languages is required.

The neglect of conditions such as exist in PNG can be illustrated by a random sample of the back issues since 1989, of the leading journal in the field, English for Specific Purposes. Of a total of 26 major articles, by far the largest number (15) deal with English for foreign students studying in first-language English-speaking communities (the U.S.A. and Britain). A smaller number of articles concern ESP for first-language English speakers in these same communities (3) and with textual analyses which do not specify the first language of the (real or intended) reader (5). Of the three articles specifically about teaching ESP in ESL communities, two ignore altogether the existence and use of other languages in these communities, and one deals negatively with the "interference" of the first language on English. These

figures indicate how little research has been undertaken into the relationship of other languages to English or to how English might complement and interact positively with these languages to accomplish communication for specific purposes.

Discussions of ESP at the international level, then, have given insufficient attention to the question, "Who is communication between?" The various ways this question is answered ought to result in distinct and different teaching strategies. Perhaps the time has come to heed more seriously the suggestion of Kennedy and Bolitho (1984: 11-12) that ESP programmes should reflect the language situation in particular communities and the role English plays in them. The extent to which English is-- and is not-- used for other more general purposes and how additional languages might fulfil the specific purpose at hand are important considerations for ESP teaching in PNG.

Communication in PNG

It has been estimated that only about one-fifth of the population of PNG understand and use English (Laycock, 1979: 84; Swan and Lewis, 1990: 210 f.). Although English is the medium of instruction from the beginning of primary school, most observations about language education in the nation indicate that at every level students' English is "ineffective and inefficient" (Ahai, 1989: 52). (See also, e.g., Lewis, 1971: 27; R.K. Johnson, 1974: 260; Dutton, 1975: 16; Kavana, 1984: 10; Swan and Lewis, 1990: 221.) If school leavers' English is inadequate and if other codes are available for communication in the speech community, then it is hardly surprising that English is not the exclusive language of the work-place (EOP) even among relatively well educated people dealing with technical matters. Indeed, in most public domains (including professional ones), code-switching and mixing occur between different languages (Muhlhausler, 1979: 168) as well as between registers (Wurm and Muhlhausler, 1977) in a single communicative situation. Smith (1990: 285) has suggested that as a post-creole continuum develops in PNG, the amount of lexical "borrowing" from English into Tok Pisin is likely to increase. All these tendencies, which are aspects of a multilingual speech community, make it difficult to consider communication (for almost any specific purpose) exclusively in terms of a single language.

The label ESP itself exacerbates the tendency in PNG to limit teaching to a single language and obscures the reality of communication in the nation. This is in spite of the fact that ESP has developed hand-in-hand with a communicative pedagogy. Since effective communication is frequently accomplished through more than one language, teaching communication should involve teaching the uses of these languages. To omit this dimension from any language teaching programme is to give our students less than adequate resources to function in society. My own department at

Unitech is designated "Language and Communication Studies". No particular language is named, and I would like to think that the omission is intentional since the communicative needs of our students do not relate entirely to their use of English. Graduates from tertiary institutions in PNG are expected to apply their technical skills to the solutions of national problems. To acquire these skills they need ESP. But they should also be able to communicate technical information to others who lack their standard of education. This is an important part of national development too.

Recent research has established that university students and graduates-- like other Papua New Guineans-- do not limit themselves to English for either professional or academic purposes. In an investigation of Unitech graduates' use of language, Swan (1986: 15) reports that three-quarters of them use Tok Pisin at work; he recommends that courses should be designed to "assist students in extending and refining Tok Pisin for professional purposes". Furthermore, in their study of the use of Tok Pisin among students at both PNG universities, Swan and Lewis (1990: 224) claim that this language is used not only for social purposes but also for study, especially by students in technological fields. Among these graduates and students, then, diglossia (Fishman, 1967) does not hold: Tok Pisin is not a code reserved for a "Low" (informal, personal, intimate) domain but operates as a "High" code for relatively formal academic and occupational purposes as well.

Laying the Foundation for LSP

I would like to suggest that more research be undertaken into the possibility of formulating tertiary language programmes in terms of an overall LSP (Language for Specific Purposes) policy, rather than a narrow ESP one. The idea of a non-English LAP is perhaps more contentious than that of a non-English LOP. This is an obvious area for further investigation, and we might, as an example, explore briefly some of the issues involved. R.K. Johnson (1977: 455) claims that in the 1970s some academics at UPNG used Tok Pisin in tutorial groups, with a degree of success, especially in regard to students' willingness to participate in discussion. Swan and Lewis'(1990: 224) research shows that although students do use Tok Pisin for academic purposes, whether they should do so is doubtful. It is suggested that such students are likely to jeopardize their chances of success, a conclusion indicated by the evidence that technological students who failed their first-year course used significantly more Tok Pisin than those who passed.

On the other hand, an equally valid hypothesis might be that even at the tertiary level the use of Tok Pisin or a Tok Ples combined with English could contribute to a student's academic success. (Swan and Lewis admit, for instance, that the correla-

tion between using Tok Pisin for studies and a high failure rate does not hold for Business Studies/Accountancy students.) Abstract concepts and principles may be better understood in a more familiar language. Aspects of traditional technologies may be more accessible in the Tok Ples languages in which they were first formulated. Terms for local PNG materials and processes may have no obvious English equivalents. However, as long as English is the main medium of science and technology, other languages would, at some stage, have to be translated into English. This could pose problems which might override any advantages gained. Clearly, the question of LAP is far from being resolved.

Proposals for research into ELT in PNG for the 1980s were put forward by Graeme (1982). Using some of these as a starting point, I suggest that research for the 1990s not be limited to English teaching but be extended to language teaching programmes which take into account the linguistic complexity of communication in the nation. As far as LSP is concerned, such research might be divided into two main areas:

(a) Linguistic: The extent to which other languages (especially Tok Pisin) are used in addition to English among students studying in specialized fields and among workers in various technical professions; what aspects of communication-- e.g., subject matter, purpose/function, medium (oral/written), participants and their relationship -- are likely to influence the selection of language used. The results of such research could form the basis of needs assessments for LSP programmes.

(b) Pedagogic: The design of syllabuses and the production of relevant locally-based materials which will combine the teaching of English with the teaching of other PNG languages for specific purposes, so that students are made aware not only of the appropriate and potential uses for each individual language but also of how they interact for communication in PNG, and the consequences of this interaction for both LAP and LOP.

The remainder of the present discussion will focus on an exercise in LSP which was conducted with students at Unitech. It might indicate, in particular, ways of investigating some of the issues raised under (b).

The Initial Assignment: an EAP Task

LA 134 (English for Communication Engineering) is a first-year subject at Unitech taken as part of the Diploma course in Electrical Engineering. In 1992, there are two sections, each consisting of about 12 students and meeting for four 50 minute periods each week. Most students have completed Grade 12, and

approximately one-third of those enroled in 1992 have some experience in employment as technicians. In addition to Language, they study Physics, Mathematics, Electronic Principles and Drawing and Fabrication. The Diploma course lasts three years, and in the third year students will specialize in either Communications or Electronics. The course is intended to prepare them to become senior technical officers/technicians who will be responsible for installing, maintaining and operating electronic and communication equipment. They are most likely to work for such organizations as PTC, NBC, DCA, BCL and similar government and industrial groups who require such services (PNG University of Technology Handbook, 1992: DECE, 1). The aims of LA 134 are two-fold: (i) to develop students' language and study skills so as to equip them to pursue their academic studies, and (ii) to prepare them for employment by developing some of the communicative resources they will require in dealing with fellow workers and members of the public in the work-place. Hence, there are elements of both EAP and EOP in E 134. Insofar as they can be separated, (i) is covered in the first semester and (ii) in the second.

As their major assignment during the first semester of 1992, students in LA 134 were given a project to investigate a piece of electronic equipment in use in PNG and in which they had an interest. They were asked to write about 2,000 words dealing with the following points:

1. Describe the components of this equipment (with the aid of a diagram if necessary).

2. Explain the process by which it works.

3. Give an account of the most important principles or laws of science which it utilizes.

4. Discuss how this piece of equipment compares with others used for a similar purpose. What is its comparative rate of efficiency?

5. How economical is it to manufacture, install, use and maintain this equipment?

6. How, where and why was this type of equipment invented? How has it been developed or improved since it was first invented?

7. How wide-spread is the use of this equipment in PNG? How does its use help to improve the quality of life in the nation? How can it best be used for this purpose in future?

8. Has this equipment been used responsibly in PNG in the past? Why or why not?

9. What social and/or economic problems or issues are connected with the use of this equipment in PNG? How best can they be

overcome or solved?

The assignment was to include a bibliography and show that library resources had been used. Students were asked to consult with staff in the departments of Physics, Electrical Engineering and Mathematics for suggestions and advice.

The topics chosen ranged from radios, telephones, television sets and computers to ultrasonic sensors, lasers, compact discs and relays. When the projects were handed in and marked, it was clear that most students had done a fair amount of research, were interested in their topics and had considered them in detail. But the language of the essays was generally confusing, prolix and grammatically complicated. Technical terms were used without explanation, and syntax was complicated and confusingly embedded. Sentence structure tended to break down under the weight of detail. In many cases raw data was reproduced verbatim from the sources used, with little attempt to adapt or organize it or to focus on the particular questions asked. A premium was placed on information rather than communication: too many facts and not enough commentary, analysis or explanation. In attempting to write about what they had not fully understood, these students resembled their predecessors at Unitech who were found by former staff in the LCS Department to be "trying to write complex sentences which end up being incomprehensible non sentences" (Holzknecht and Smithies, 1980: 65). On the other hand, these same LA 134 students' previous work in shorter, more structured assignments had indicated that they were capable of writing English articulately when the nature of the communicative task was specified.

The source of the problem in this case was probably in part due to the fact that students were unclear about who would be reading what they had written. In preparing the project, they had gathered material from sources meant to be read by technicians, engineers or trainees in electronics, and almost always these assumed readers were first-language speakers of English. Thus, students were accustomed to reading texts on their chosen topic intended for readers with comparatively advanced linguistic skills as well as specialist knowledge of the subject. It was to be expected that unless instructed otherwise, they would try to imitate the style of these texts. A weakness in the original assignment question was that students had not been told who they were supposed to be writing <u>for</u>. The failure to identify the intended receiver is a common failing of academic exercises, even in ESP programmes. As a result, what students produce in assignments are often "unreal" texts. Communication in such circumstances may break down because an important principle is not observed. Both participants in a communicative act assume, among other things, that the sender of the message will not give more or less information than is required for the current purposes of the exchange. Grice (1975) has formulated this principle as the Maxim of Quantity.

Ordinarily the sender judges the appropriate quantity of information to give to the receiver according to his/her notion of how much the receiver already knows. But in an academic assignment, the student (the sender) can usually assume, and does assume, that the teacher knows more about the topic than the sender does. Under typical classroom conditions, a question from the teacher does not usually express the asker's ignorance. Pragmatically, then, there is no real need for the sender to communicate anything at all to the receiver. Yet this is required in an assignment. Hence, answering such a question can appear to be an unnatural communicative act. For the sake of education, of course, the Maxim of Quantity is suspended. Teachers and students have learned to play a game: the asker pretends not to know the answer; the answerer pretends that s/he is not telling the asker what is already known. Hence, it appears to the student to be sufficient merely to copy out the facts from a book since the receiver (the teacher) already knows them. But in much ESP teaching (certainly in the present case) when the teacher is not an expert in the technical field, the Maxim of Quantity is actually upheld. The LA 134 teacher did not know the answers and was genuinely seeking information. This was possibly one reason for the poor quality of many of the papers: students thought the purpose of writing was to indicate how much they had read rather than to enlighten their receiver with new information.

From EAP to EOP

The original project assignment was used as a point of departure for the transition between the first and second semester's work, a movement basically from EAP to EOP. During the first week of the second semester the classes were asked to consider differences between language for communication in academic and professional work. After discussion, the following contrasts were suggested.

LANGUAGE FOR COMMUNICATION IN ELECTRONICS IN PNG

At Unitech	In the work place
1. Theoretical	1. Practical
2. Explanation	2. Demonstration
3. Technical terms	3. Ordinary terms
4. More language used	4. Less language used
5. More writing and reading	5. More oral language
6. Formal language	6. Informal language
7. English	7. Several languages (e.g., English, Tok Pisin, Tok Ples)

The effect on language choice of the relationship between sender and receiver is perhaps more apparent in EOP than in EAP. In the work-place, the sender needs to be aware of the receiver's

degree of knowledge, experience and skill with language. A miscalculation with regard to any of these factors can hinder effective communication. For this reason, appropriate teaching methodologies for EOP are simulation and role playing. Students need practice in considering and answering the question: Given a particular communicative event, which language choices should be made? After they graduate, LA 134 students are likely to be in supervisory positions. An important part of their job will be to provide information in a form that can be readily understood by staff less qualified than they are. If they had to communicate to such receivers about the equipment they had selected for their project, for instance, these students would need to deal with the same concepts in more accessible language.

An EAP project, then, became the basis for EOP work. Students were asked during a single class period to write an account from memory, in their own words and in one paragraph, of how their chosen equipment functions. This time no textbooks or other sources of information were used. Part of the purpose was to determine how well students had understood the technical language they had read (and sometimes copied) in writing the original assignment. To this extent, it was another exercise in EAP. But now the identity of the receiver was specified. Students were told to imagine themselves to be supervisors communicating with workers under them who had only a junior secondary school education. This would require simpler English, and students were instructed to give special attention to sentence structure and vocabulary appropriate to such receivers. Following is a paragraph produced according to these instructions:

USE OF LASER IN COMMUNICATION AND REMOTE CONTROL

> The laser beam is a light beam of a very high frequency. It goes through a very complicated process in communicating. Firstly the laser beam is produced by the flash tube. The beam is induced out of the tube (crystal) by the process of pumping. The laser beam is reflected back and forth by mirrors at each end of the laser pumping machine. The larger frequency accumulates to a maximum frequency so that at one end the mirror (which was coated) cannot reflect the laser but lets it pass through. But before the laser penetrates the end mirrors, it has to pass through the modulator. The modulator encodes the information into the laser beam by varying the frequency of the beam. The variation of the frequency of the beam determines the information transmitted. In the same way the beam which was transmitted is captured by a disc at the receiving end. The beam is captured and reflected through the modulator of the receiving end to decode the information from the beam to the electrical impulse. From there an electrical impulse can be converted into sound waves, or into pictural information on a television or computer screen on the receiving end.

Now this paragraph is still complex, and the writer is not entirely successful in conveying how a laser operates to at least one unknowledgeable reader. The grammatical structure is still complex, and some terms (frequency, modulator, encodes) need to be explained and/or simplified. Moreover, some essential details are omitted from the account, and it is mistakenly taken for granted that the reader can supply them. For instance, what does the process of pumping involve? Why and with what are the mirrors coated? During class discussion, it was suggested by some students that no complex technical process can be explained adequately and simply to a receiver who is unfamiliar with the relevant scientific principles. To elaborate on such terms as frequency and modulator here would result in a text whose central purpose (to describe a laser) would be lost in a mass of elementary explanation. This is no doubt true in principle, but it is a practical problem students will confront in their professional careers. It may ultimately be impossible to explain a laser to someone without a basic knowledge of Electronics. But in the real world the impossible must often be attempted.

In any case, from the point of view of the inexpert receiver (the LA 134 teacher), this text is a significant improvement over the original project paper. There are probably two reasons for this: (i) the student is working entirely from memory and is unable to rely on reference works (and hence is not tempted to copy out chunks of undigested material), and (ii) he has a particular kind of receiver in mind, one whose technical knowledge and English language skills are less advanced than his own.

LOP and LAP

After completing this assignment, students were next asked to imagine a receiver even less educated than the first, someone with only a primary school education and with very little English. Communication with such a person would require using a lingua franca, in this case Tok Pisin. (Responses to a questionnaire given at the beginning of the academic year had established that all students in the class knew Tok Pisin.) At this point some students expressed doubt about whether anyone would ever be employed as an electrician in PNG who did not know English well enough to talk about and understand the technical aspects of their work, since all training in Electronics is in this language. It was, in effect, silly and a waste of time to try to communicate these ideas in language inappropriate to and inadequate for technical topics. However, students who had some experience working in the field of Electronics said that in their work it was often necessary to communicate not only in simple English but sometimes in English mixed with Tok Pisin and occasionally in Tok Pisin alone.

The students' initial objection to writing in Tok Pisin lends support to a suggestion made by Robinson (1985: 10) about a

previous group of LA 134 students at Unitech: that they are learning scientific and technical concepts and the relations between them in English, rather than translating them from another more familiar language into English. The ideas of Electronics are considered to "belong to" English, not to Tok Pisin. It was clear that few students in the present class had considered the possibility that the subject matter they were pursuing in their Electrical Engineering course could exist in any medium other than English. To ask them now to try to make a connection would involve an intellectual and psychological reorientation and would require a degree of imagination and clear thinking. It would also involve elements of both LAP and LOP, just as the first stage of the exercise had involved EAP and EOP. On the one hand, the effort to put the paragraph into Tok Pisin would test their cognitive ability: they would need to understand the concept thoroughly if they were to translate into the other language. This would be an aid and a stimulus to mastering the academic subject matter. On the other hand, they would be engaging in a practical use of language which, for better or worse, occurs in PNG in daily communication between technicians on the job.

This stage of the exercise resulted in the following paragraph by the same student who had written the previous one:

USIM LASER LONG CONTROLIM NA SALIM TOKTOK

> Laser lait em i wanpela strong pela lait tru. Em i kamap long wanpela machine ol i mekim long glass ston, lait tube na mira. Dispela machine isave wok olsem. Pastaim dispela lait tube i wok long raunim glas ston olsem wanpela sinek i laik na i mekim lait i kam out long glas ston. Ol i kolim kain wok olsum pumping. Laser lait i go long frant mira na i lait i kam back i go long baksait mira na em i mekim seim kain samting tasol. Em laser lait we bai mira i no inap stopim olsem na mira i lavim laser lait i go kamap long hapsait. Tasol pastaim em i mas go long modulator long makim tok save antap long em taim em i makim laser lait igo bikpela na liklik. Kain kain strong bilong laser liat em i kan tokim wonem kain toksave i stap long dispela laser lait ol i ken kisim wantaim sampela samting ol i kolim disc. Disc i kisim ol laser lait na i bungim ol i go lik lik na i go kamsap long modulator na modulator i ken kamautim tok save long dispela laser lait taim em i ken luk save long long strong bilong dispela lait na i ken putim or mekim kamap long spika or piksa box.

Giving Alternative Definitions for Technical Terms

Having established the possibility of communicating Electronics in Tok Pisin, the class went on to consider whether various technical terms could effectively be expressed in this language. An attempt has been made to translate terms from anoth-

er scientific field, Biology, into Tok Pisin, in these examples from Simon (1977: 32):

EPICOTYL: Nem bilong hap long stik bilong kru i kamap long graun. EPICOTYL em i hap long stik is stap antap long lip bilong kru bilong diwai.

EPIDERMIS: Nem bilong ausait skin bilong animal na diwai.

EPIGEAL: Nem bilong pasin bilong sampela animal na diwai i save sindaun antap long graun.

There is apparently no comparable dictionary for Electronics or Physics. In trying to arrive at similar types of definitions for terms they were dealing with in their Electronics course, students would not only engage in a pedagogical activity, but they might also contribute practically to the groundwork for such a dictionary in this field. One strategy they were encouraged to use in supplying Tok Pisin explanations was suggested in class: to make a comparison with something already familiar to the receiver. This technique had been used, for instance, by the writer of the Tok Pisin paragraph on the laser: "Pastaim dispela lait tube i wok long raunim glas ston olsem wanpela sinek i laik na i mekim lait i kam out long glas ston, lait tube na mira." In formulating definitions such as these, students would need to be sensitive to the degree of knowledge and experience of their assumed receiver. Another way of explaining terms was explored as well. This was to use a mixture of Tok Pisin and English. In class discussion, it was pointed out that actual communication in the work-place in PNG can occur in a mixture of languages. Mixing of languages in the same communicative event is becoming increasingly common, especially in urban PNG (see, e.g., Muhlhausler, 1979), for both social and professional communication.

Using these two possible modes of expression (Tok Pisin alone or a combination of Tok Pisin and English), students gave the following definitions of terms they were currently studying or had recently been studying in their Electronics subjects:

CURRENT

Movement of very liklik samting (cannot be seen) called electrons

Ron bilong pawa taim em igo as long wanpela fix ples

ALTERNATING CURRENT

Current move one direction, turn around move opposite direction

Em i toktok long ron blo pawa we i ken senis rot, pawa iken ron igo het or kam bek lo wankain rot insait long waia

DIRECT CURRENT

Movement of planti liklik samting ol kolim electrons ikam from wanpela sait blong circuit igo long narapela sait, em i save travel long stretpela lain tasol

Pawa isave ran long wanpela rot tasol

INDUCTANCE

Inductance em i wanpela kain wei bilong gipim strong long narapela samtin by narapela samting istap long we or klostu, tasel tupela ino tasim each other

CONDUCTANCE

Strong blong pasim strong blong power long go long narapla sait long kaim samting olsem ain

RESISTOR

Em i samting we i save pasim stron bilong pawa na save makim i go long size bilong samting bai wok

Em i wanpela material ol i save usim long limitim or shortim current igo long narapela ap wire

CELL

Dispela em i narapela nem bilong bateri wok bilong em, em i bilong givim pawa long radio, sutlam na ol narapela samting tu. Pawa bilong cell o bateri taim i pinis yu mas rausim na baim nupela.

Cell em batari tasol em i save givim strong long kain samting olsem radio long wok

MAGNETISM

Strong bilong ain we em i ken pusim na pulim nara pela ain

Magnetism emi pasim bilong magnetic material long pulim samting i kam or rausim samting igo.

CAPACITOR

Em i wanpela kain electronic component olsam lik lik kateres we em i save storim electrons wantain yus bilong pawa na taim pawa i ran emi releasim electron gen.

The extent to which these definitions are accurate and clear

can be judged only by someone familiar with both Tok Pisin and Electronics. As an assignment for class, though, the process of writing them provided an insight into some of the problems and possibilities inherent in communicating concepts from Electronics in PNG. One problem that came up in class discussion was the difference between translation and explanation. It was pointed out that the Tok Pisin definition would usually need to be longer than the English one because much less could be taken for granted about the receiver's state of knowledge. Terms such as current, magnetic and electron in the above examples remained in English because Tok Pisin had no equivalent terms. If they too were to be put into Tok Pisin, then the result would be a lengthy explanation, an interpretation, rather than a definition.

A related question that was dealt with in class discussion was whether Tok Pisin was sufficiently "developed" as a language to handle some of the necessary distinctions between various phenomena in Electronics. The Tok Pisin word pawa, for example, had been used in these definitions in place of several more precise concepts designated in English by the words current, circuit and electron. The definitions in which pawa was used, then, might be too general to have much practical value to a technician who would require more precise distinctions in meaning. The alternative seemed to be between using the Tok Pisin term (and failing to be precise) and using the English term (and risking incomprehension). It is undoubtedly difficult to apply a "new" language to communicate concepts which have previously been expressed only in another. However, it was suggested in class that this is a problem to be solved rather than an insurmountable obstacle. Most students came to accept that PNG languages other than English (Tok Pisin and Tok Ples) are not inherently "limited" in their ability to express technical concepts, a view put forth, for instance, by Ahai (1984: 32). If speakers work to refine and adapt Tok Pisin, they can communicate effectively in whatever domain they wish to use it. One purpose of the present assignment was to open up some of these possibilities.

Translation for LAP and LOP: Language Choice and the Sender's Idea of the Receiver

The last stage of the exercise consisted of several writing activities done in sequence. First students selected a passage of not more than 100 words which they had read and studied from the textbook (Grob, 1984) used in their Electronics subjects. The passage was chosen on the basis of their interest and/or any difficulties with comprehension they might have had. The first activity was to copy out the passage accurately. It was explained that this was not a pointless task since the process would force them to concentrate on the language of the text, especially on its vocabulary and sentence structure. An awareness of these features would be crucial to the next stage of the exercise. This consisted of putting the passage into a simpler form of English and to produce a text suitable for a receiver with not more than

a Grade 10 education. The third stage was to use this simplified English version as the basis for an explanation in Tok Pisin. The Tok Pisin versions produced by each student were then photocopied and randomly distributed to other members of the class, who made a translation back into English. Thus there were four separate texts, expressing the "same" content but intended for three different kinds of readers:

(a) the extract from the textbook;
(b) the simplified English version;
(c) the translation into Tok Pisin;
(d) the translation back into English done by another student.

The assumed receiver of text (a) was a tertiary student of Electronics, though not specifically a Papua New Guinean (Grob, 1984: Preface, xiii). Text (b) assumed an electrician with perhaps some technical training but not at university level. Text (c) was intended for someone with even less education, who would not be able to understand the ideas if they were expressed in English. The final part of the exercise was to give text (d) to the writer of (a), (b) and (c). By comparing (d) to (b), the original writer could judge how successful the translation (c) had been in communicating the sender's original meaning in (b). From the feedback provided by (d), s/he would have an idea of how close the assumed reader was to the real one. Text (d) in a sense was a check on the adequacy of (c) as a version of (b). As well as encouraging students to consider the relationships and contrasts between English and Tok Pisin, this exercise was meant to sensitize them to the need to select both an appropriate language and an appropriate style or register of language for communication in PNG.

To illustrate this part of the exercise, three examples are given, based on the original textbook accounts of Conductors, Current and Open Circuit. Some of the rewritings into simpler English and the translations into Tok Pisin indicate that students are engaging in similar strategies for language use as were apparent in the previous assignments. The definitions, "Karent em i liklik samtin olsem bal insait long waia e no stop long mov na baut" and "Circuit em i rot bilong pawa," for example, would probably be intelligible to a speaker of Tok Pisin who knew very little about electricity and, at the same time, had never before heard these particular Tok Pisin expressions actually used in communication.

CONDUCTORS

Original from Textbook: Conductors are materials that allow current to flow easily. They have a large number of free electrons in their structure. Most metals are good conductors. Silver is the best conductor, and copper is next. Copper is the most widely used conductive material because it is less expensive than silver.

Simplified English Version: Substances that act as a path for electricity allow a flow of electricity past a point more easily. These substances have a large number of very small pieces of matter that produce electricity, in their body arrangement. Most metals are good pathways for electricity to flow or move. Silver is the best of all, followed by copper. Copper is commonly used because it is cheaper than silver.

Translation into Tok Pisin: Ol samting we pawa isave ron insait long ol wantaim nogat tuhat em i kolim kondakta. Dispela ol samting igat planti lik lik ol samting gen husat isave givim lait, insait long ol. Ol kain samting olsem aion emi gutpela rot bilong pawa long ron. Silva emi namnawaa tru long el arapela aion, na bihain long en emi kopa. Planti taim ol i save usim kopa long mekim wok bilong wanem emi sip moa long silva.

Translation from Tok Pisin back into English (by another student): A conductor is something in which electricity is conducted easily. A conductor has many electrons in it which give light. An example would be an iron which conducts electricity very easily. Silver is a very good conductor followed by copper. Many times copper is used because it is cheaper than than silver.

CURRENT

Original from Textbook: The current is a continuous flow of electrons. Only the electrons move, not the potential difference. For ordinary applications, where wires are not long lines, the potential difference produces current instantaneously through the entire length of the wire.

Simplified English Version: Current is a non stop flow or movement of very tiny small imaginary spheres in the wire. Only these small spheres move, but not the change in the strength of the power supply. For ordinary uses, where the wires are not long lines, the change in strength of the power supply produces non-stop flow of the small imaginary spheres at once through the whole length of the wire.

Translation into Tok Pisin: Karent em i liklik samtin olsem bal insait long waia e no stop long muv na baut. Dispela liklik samtin i muv na stron bilong pawa i no muv. Long taim we waia i no longpela, stron bilong pawa i mekim dispela liklik samtin olsem bal i go kwik ong olgeta hap insait long waia.

Translation from Tok Pisin back into English (by another student): Current is a very small object like a ball moving inside a wire. This little object moves, but the strength of the power doesn't. If the wire is short, the strength of the power causes this little object to move quickly to all parts of the wire.

OPEN CIRCUIT

Original from Textbook: When any part of the path is open or broken, the circuit is open because there is no continuity in the conducting path. The open circuit can be in the connecting wires or in the bulb's filament as the load resistance. The resistance of an open circuit is infinitely high. The result is no current in an open circuit.

Simplified English Version: It is very easy for anyone to understand the word open, but what about an open circuit? To help us understand the word circuit, let us think of the word as roads that provide the path for cars to move on. Roads help us to travel to different places or parts of the city or gardens. As long as the road is not washed away by floods the cars will keep on moving. In much the same way, the word circuit means a road for current to travel in, to different parts of equipment to make it work, but if we want that equipment to stop working we must open the circuit. So the term open circuit may also mean an off and on switch. When we switch on, the current leaves, the battery comes through the switch and goes into the equipment to make it work. Once we are finished with it and we want the equipment to stop, we open the circuit or switch off the power.

Translation into Tok Pisin: Plenty bilong yumi i kilia long dispela tok opim, tasol long circuit em yumi i no kilia tumas o yumi no sape tru. Long helpim yumi long kilia yumi mas lukim olsem circuit i olsem rot bilong kar i sape ron. Rot bilong kar i sape go long plenti hap. Circuit em i rot bilong pawa i lusim battery na i go long masin long makim em i work. Taim yumi pisim long masin na yumi pinis long em orait yumi pasim pawa. Long pasim pawa yumi mas opim circuit. Opim circuit em i naropela nem switch. Taim yumi laikim masin i wok yumi putim on, taim yumi pinis long em, yumi opim circuti ol switchim off pawa.

Translation back into English (by another student): We all know about the word open but not when we are talking about open circuits. To help us understand what a circuit is, we take it as a road or pathway for vehicles to travel. The pathway goes through plenty of

places. In electricity, a circuit is a complete pathway for current to flow from the power source, such as a battery through a load and back to the source. Load refers to any electrical appliance or component. To stop the current from flowing, we simply open the circuit by disconnecting one part of it. In doing so, we open the circuit and no current flows. A circuit can be opened using a switch.

Conclusion and Recommendation:

It is hoped that this account of how an exercise in LSP was carried out at Unitech might be of interest to teachers and researchers concerned with language in education. Discussion of language policy for education in PNG has usually concentrated upon the medium of instruction and initial literacy in community schools (see, e.g., Litteral, 1975 and Kerema, 1989). But language policy is an issue which should also be addressed at the tertiary level and, indeed, throughout the educational system. Students' work has been quoted extensively here not to show how "well" or how "poorly" they performed, but rather to indicate some of the strategies they employed to cope with the communicative tasks at hand, tasks similar to those which will confront them in their careers after Unitech. These texts should be suggestive of the types of problems students had in doing the work and the means they used, or did not but might have used, in overcoming them. Since this exercise was an experiment, several inadequacies became apparent at various stages. In particular, it was clear that insufficient time was given to oral presentations. Most communication in Tok Pisin in the work place occurs in the spoken mode, and even though written assignments have the advantage of being a relatively permanent record, there are differences between speech and writing which should have been pursued.

Nevertheless, that this was a valuable exercise seems clear. Languages more familiar than English have a role to play in LAP. The mental processes involved in simplification, translation, explanation and interpretation from one language into another require that concepts be clearly understood and that a considerable linguistic facility be utilized. Students were forced to think about the subject matter they were learning in a new way. Such renegotiation of meaning, the ability to see phenomena from more than a single perspective, is an important part of university education. The exercise is also related to LOP, in helping to develop skills students will inevitably need to use when they take up employment. To communicate effectively in their professions, technicians need to be able to express complex ideas in other languages, which they have originally acquired and mastered through English. Moreover, as Papua New Guineans concerned with national development, students should accept the responsibility of communicating their technical knowledge after leaving university. They will benefit fellow workers who are less fortu-

nate than they are in having achieved higher education. In imparting their skills to others, they will raise the level of technical expertise in the nation and help to justify the financial investment made in higher education.

The intention of this paper has not been to suggest that English be replaced by Tok Pisin or any other language for either academic or professional purposes. And it is certainly not recommended that ESP be supplanted by TPSP (Tok Pisin for Specific Purposes) in Electronics and similar courses offered at Unitech. English is clearly the most important medium for Science and Technology (EST) in PNG and is likely to remain so. However, this does not imply that other languages for science and technology should be neglected. The amount of class time devoted to the exercise in LSP was two weeks (approximately 8 hours for each group). The subject LA 134 itself covers a total period of 30 weeks. It does not seem excessive, either educationally or professionally, to devote one-fifteenth of class time to such work at the expense of exercises done entirely in English. Given the linguistic complexity of the PNG speech community, the Department of Language and Communication Studies would be failing in its duties if Unitech graduates embarked upon their professional careers under the impression that communication in their area of expertise is accomplished entirely through the English language. It is recommended, therefore, that institutions of higher education in PNG-- and particularly those which offer vocational and technical training-- should give some attention to languages other than English and develop LSP policies.

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